

SUPPORT FOR THE AMENDMENT

Support for the amendment to claim 1 is found on page 2, line 19 through page 3, line 5 of the specification. Claims 2-6 and 8-11 have been suitably amended to reflect the supported amendment of claim 1. No new matter would be added to this application by entry of this amendment.

Upon entry of this amendment claims 1-6 and 8-12 will remain active in this application.

REQUEST FOR RECONSIDERATION

The claimed invention is directed to a process for producing substituted benzoyl chlorides such as trimethylbenzoyl chloride (TMBC).

TMBC is an important raw material in the preparation of acylphosphine oxide type photoinitiators. Simple and economically viable methods for the preparation of substituted benzoyl chlorides are sought.

The claimed invention addresses this problem by providing a process for preparing substituted benzoyl chlorides by reacting substituted benzenes with CCl_4 in the presence of AlCl_3 to form the corresponding substituted trichloromethylated benzene with accompanying hydrolysis of a formed AlCl_3 complex, followed by hydrolysis of the trichloromethylated benzene using **an aqueous organic phase** from the hydrolysis of the AlCl_3 complex followed by distillation of water-free CCl_4 . Applicants have discovered that addition of catalyst to the aqueous organic phase from hydrolysis of AlCl_3 is sufficient to form substituted benzoyl chloride in high yield and to yield CCl_4 of sufficient dry to be recycled to a Friedel-Crafts reaction without further drying. Such a process is nowhere disclosed or suggested in the cited references of record.

The rejection of claims 1-6 and 8-12 under 35 U.S.C. §103(a) of Hugo, U.S. 3,187,057 in view of Böckmann et al., U.S. 4,276,321 is respectfully traversed.

Neither reference discloses or suggests hydrolysis of a trichloromethylated benzene in an aqueous organic phase from the hydrolysis of AlCl_3 complex.

As noted by the Examiner, Hugo et al. describes the formation of substituted trichloromethyl benzenes and further conversion to substituted benzoic acids by hydrolysis. A hydrolysis step to benzoyl chloride is not disclosed (page 4, lines 12-13 of the outstanding Official action).

Böckmann et al. describes hydrolysis of substituted benzotrichloride with substituted benzoic acid and/or water (column 1, lines 28-42). The reference does not describe hydrolysis in the presence of an aqueous organic phase, as claimed. None of Examples 1-4 suggest inclusion of an aqueous organic phase, as claimed, during the hydrolysis process.

In contrast, the claimed invention is directed to a process for preparing substituted benzoyl chlorides by preparation of trichloromethylated substituted benzenes from substituted benzenes by reaction with CCl_4 in the presence of AlCl_3 followed by hydrolysis and hydrolysis of trichloromethylated benzenes by addition of a catalyst using the aqueous organic phase from the hydrolysis of AlCl_3 . Applicants note that the aqueous organic phase from the hydrolysis of AlCl_3 will contain CCl_4 , a reagent in the acylation reaction. As the cited references fail to disclose or suggest hydrolysis of substituted trichloromethylated benzenes in an aqueous organic phase, as claimed, the claimed invention is clearly not rendered obvious by the cited references.

Applicants note the examiner's assertion of the level of skill of one of ordinary skill in the art on page 4 of the outstanding Official Action and object to the analysis, consideration and conclusion (M.P.E.P. 2141.03I).

In asserting obviousness, the examiner asserts that 1) “it is common and desirable in the art not to perform purification after the first step” and that 2) there would be motivation to collect CCl_4 for reuse.

Applicants respectfully submit that the assertions made by the Examiner are unsupported by any evidence and directly contradicted by the references relied upon in the Official Action. Specifically, Hugo in preparing substituted trichlorobenzenes, after destroying AlCl_3 complexes, separates a water layer and repeatedly washes the organic layer with water followed by removal of excess CCl_4 under reduced pressure (column 3, lines 50-54). Accordingly, the only reference cited by the Examiner for the production of substituted trichloromethyl benzenes are washed with water and removes organic solvent (e.g. purification steps) prior to further hydrolysis reaction.

Böckmann et al., in examples 1-4 subjects the product benzoyl chloride to purification by distillation. Accordingly, the evidence of record is contrary to the examiner’s assertion and therefore purification of reaction products is clearly **evidenced** by the references cited by the Examiner.

No Motivation To Conduct Hydrolysis Using Aqueous Organic Phase

Böckmann et al., the only reference relied upon by the examiner for hydrolysis to benzoyl chloride, fails to disclose or suggest hydrolysis in the presence of an aqueous organic phase, as claimed. To the contrary, no organic phase as claimed is recited in any of Examples 1-4. The reactions appear to be conducted in the absence of any organic solvent. As such, there is no evidence to suggest that a step of hydrolysis of trichloromethylated benzene to substituted benzoyl chloride in the presence of an aqueous **organic** phase as claimed would be obvious as there is no evidence of such hydrolysis conditions.

While applicants have discovered that hydrolysis of substituted trichloromethylated benzenes in the aqueous organic phase from the hydrolysis of AlCl_3 to provide an effective

and productive method in the preparation of substituted benzoyl chlorides, the examiner's assertion as to obviousness are simply not supported.

No Motivation To Remove CCl₄ From Trichloromethylated Benzene Hydrolysis

While the examiner asserts that since there is no CCl₄ present in the hydrolysis of Böckmann et al., there would be nonetheless the motivation to distil such CCl₄ if one were used during the hydrolysis. To the contrary, the evidence is that there would be no motivation to remove CCl₄ from the hydrolysis of Böckmann et al., as there would be no motivation to include CCl₄ in the hydrolysis of Böckmann et al.. Böckmann et al. describes hydrolysis in the **absence of such solvent**. The Examiner has already stated there is general motivation to make processes faster and cheaper, and therefore the inclusion of a solvent such as CCl₄ is contrary to such goals. The addition of CCl₄ would make the process of Böckmann et al. neither faster nor cheaper as there would be costs associated with the addition of CCl₄. The examiner's motivation not to remove CCl₄ from the process of Hugo cannot then be contradicted and used as motivation to remove CCl₄ from the process of Böckmann et al.

Clearly the motivation to remove CCl₄ from the process of Böckmann et al. is equally present for the process of Hugo et al. and accordingly the examiner's assertion of obviousness are unsupported by the cited references.

Furthermore, by distillation of CCl₄ from the trichloromethylated benzene hydrolysis step, applicants are able to obtain a CCl₄ product which is superior to CCl₄ obtained by distilling CCl₄ from the aqueous organic phase from the hydrolysis of AlCl₃. By conducting catalytic hydrolysis of trichloromethylated benzene with an aqueous organic phase from the hydrolysis of AlCl₃ a portion of the water in the aqueous organic phase is reacted and the water concentration reduced such that distilled CCl₄ is dry enough to be recycled into a Friedel-Crafts acylation reaction without further drying. Friedel-Crafts acylation is a reaction which is adversely affected by the presence of water. Distillation of the aqueous organic

phase from the hydrolysis of AlCl_3 would contain water due to a water/ CCl_4 azeotrope, water which would otherwise need to be removed prior to introduction into a Friedel-Crafts acylation.

As the cited references fail to disclose or suggest a method in which substituted trichloromethylated benzenes are hydrolyzed using the aqueous organic phase from the hydrolysis of AlCl_3 , the claimed invention is clearly not obvious from the references and accordingly withdrawal of the rejection under 35 U.S.C. §103(a) is respectfully requested.

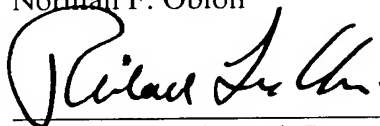
The rejection of claims 1-6 and 8-12 under 35 U.S.C. §112, second paragraph, has been obviated by appropriate amendment. Applicants have now amended the claims to recite the structures for formula (Ia), (IIa) and (IIIa). Accordingly, withdrawal of this ground of rejection is respectfully requested.

Applicants have addressed the examiner's objection to the specification by adding the continuity information as requested.

Applicants submit this application is now in condition for allowance and early notification of such action is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



Richard L. Chinn, Ph.D.
Registration No. 34,305

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)
RLC/rac